

PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

09 FEB 2005

Applicant's or agent's file reference DPWY1518	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03419	International filing date (day/month/year) 06.08.2003	Priority date (day/month/year) 10.08.2002
International Patent Classification (IPC) or both national classification and IPC B01J31/24		
Applicant LUCITE INTERNATIONAL UK LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 16.02.2004	Date of completion of this report 04.10.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Breimaier, W Telephone No. +49 89 2399-8327 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/03419

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*

Description, Pages

1-46 as originally filed

Claims, Numbers

1-30 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/03419**

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-30
	No: Claims	
Inventive step (IS)	Yes: Claims	1-30
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-30
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

D1 : WO 01/72697

D2 : WO 03/070370

D3 : WO 01/10551

The document D1 describes the carbonylation of pentenenitrile with CO in the presence of water and alcohol and a catalyst system comprising (c) a VIII group metal and (d) a bidentate phosphine of general formula (I) with a phospho-adamantyl moiety at a temperature of from 80 to 125°C (see claims 1 and 8; page 7, lines 15-17 and 28-30; page 8, lines 4-12).

The document D2 describes the carbonylation of ethylenically unsaturated compounds with CO and water and a catalyst system comprising (c) a VIII group metal and (d) a bidentate phosphine with a phospho-adamantyl moiety. These ligands are prepared by a process wherein the P-groups are introduced via a P-adamantyl group (see pages 10 and 11).

The document D3 describes a catalyst system comprising (c) a metal, preferably Pd, (d) a ligand, preferably a bidentate phosphine ligand with alkyl pendants and a polymeric dispersant for use in the carbonylation of ethylenically unsaturated compounds (see claim 1, pages 5 and 6). The catalyst system does not comprise an adamantyl moiety.

novelty

The subject-matter according to claims 1 to 30 is novel in the sense of Art. 33(2) PCT.

The present application concerns a catalyst system for the carbonylation of an olefinically unsaturated compound which essentially differs from the known catalyst systems of the available prior art in the bidentate phosphine ligand of general formula (I) according to claim 1 bearing adamantyl ligands "Ad" attached to the bidentate phosphine. Novelty of the subject-matter according to claims 1 to 30 is therefore given.

inventive step

The subject-matter according to claims 1 to 30 is based on an inventive step in the sense of Art. 33(3) PCT.

The problem posed in view of the closest state of the art D1 to D3 is considered to be the provision of a novel catalyst system in order to improve the carbonylation of

ethylenically unsaturated compounds. This is solved by using a catalyst system according to claim 1 wherein the phosphorous atom of the bidentate phosphine ligand is linked to a particular tertiary carbon atom which has been shown in the tables 2 and 3. In the absence of any hint in the available prior art that the present adamantyl substituted catalyst would show superior catalytic properties, this finding is surprising and an inventive step is also acknowledged.

Further deficiencies:

- a. The vague term "lower" in the claims are not specified by the number of carbon atoms in question (see pages 5 and 6 of the description).
- b. The term "etc" is not deleted from claim 18.
- c. The above documents D1-D3 are not cited in the description.
- d. The passage starting on page 45, line 7 bridging page 46, second line is considered to be superfluous.